Space Weather Forecast

Issued on Tuesday, 03 January 2023 at 00:23 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: Chance of Moderate solar activity throughout. Chance of Minor Geomagnetic Storm intervals form late on day 1 (03 January) onwards.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar activity has been Low with a number of C-class flares, the peak flare being C9.4 from the large region in the northwest quadrant early on 02 January. There are five regions in total on the visible disc. The other region in the northwest has been relatively quiet, along with the two regions in the southeast. A region in the northeast has been producing sporadic low energy C-class flares. There were no obvious signs of Earth-Directed Coronal Mass Ejections (CMEs) in the available imagery during the period.
Solar Wind / Geomagnetic Activity: Solar winds have declined from elevated to slightly elevated levels as the Earth moves out of a region of fast solar winds. Total magnetic field strength has been weak, with the north-south component weak but persistently negative. Geomagnetic activity was mainly Quiet to Unsettled (Kp 1-3).
Energetic Particles / Solar Radiation: The count rate of energetic particles (high energy protons) was at background with no solar radiation storms occurring.

Four-Day Space Weather Forecast Summary

Solar Activity: Mainly Low solar activity is expected, with an increased risk of Moderate activity. There is a slight chance of X-class flares due to the developing regions on the disc and from regions due to rotate onto the disc through the next four days.
Solar Wind / Geomagnetic Activity: A CME which left the Sun on 30 December is forecast to arrive at Earth on day 1 (03 January) but with low confidence. No further CMEs are currently forecast to affect the Earth. The recent fast wind is declining in speed and is forecast to continue to wane through much of day 1 (03 January). Further fast winds, from two different solar regions, are then forecast to connect on day 2 (04 January) giving elevated solar winds. Geomagnetic activity is forecast to start Quiet to Unsettled on day 1 (03 January), with an increasing chance of Active or G1/Minor Storm intervals through 03 and 04 January due to either CME or fast wind effects. Residual geomagnetic storming is then possible for day 3 (05 January).
Energetic Particles / Solar Radiation: The count rate of energetic particles (high energy protons) is forecast to remain at background with no solar radiation storms occurring. However, there is a slight chance of these rising in response to any larger flares that may occur, and perhaps exceeding the S1/Minor Radiation storm level.

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Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	20	30	30	20
Strong	G3	No	1	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	No	40	40	40	40
Very Active	R3 to R5 X	No	5	5	5	5

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	No	5	10	10	10
Very Active	≥ S3 *	No	1	1	1	1

* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)

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